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(54) **Heat exchanger**

(57) A heat exchanger comprises three coaxial tubes (1, 2, 3). The central tube (1), which is a twisted tube with a helical swell, is closed at one end 8, is coaxially enclosed between the external tube (3) and the internal tube (2) and is sealed at the other end 4 to the external tube 3. The exchanger is provided with O-ring seal gaskets (5, 6, 10, 11). The heat exchanger may be readily disassembled.

Fig.2

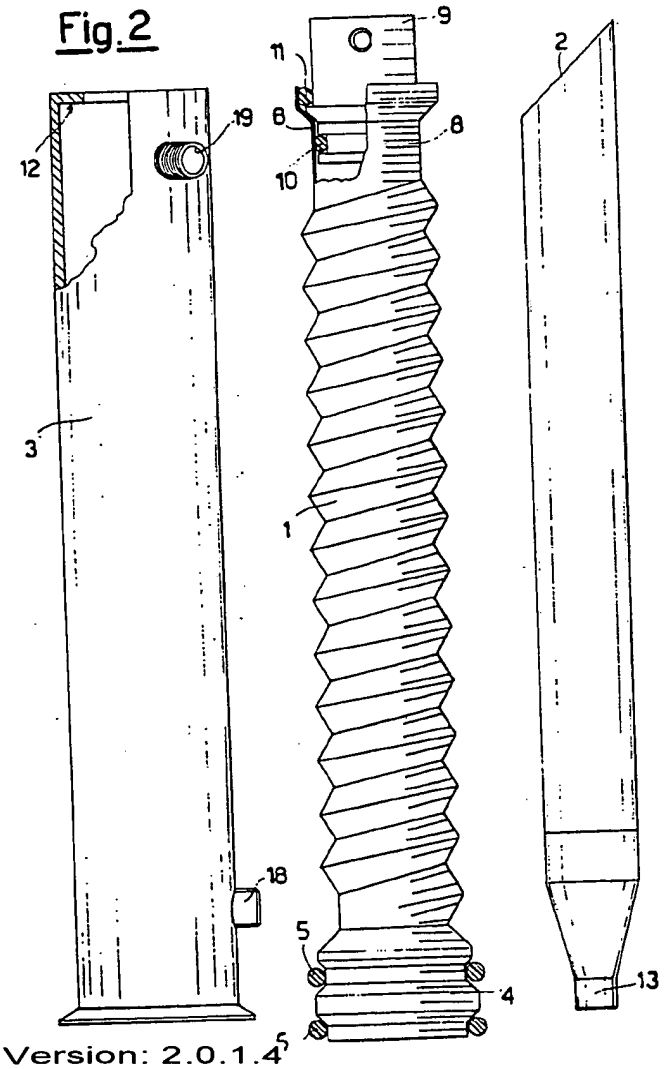

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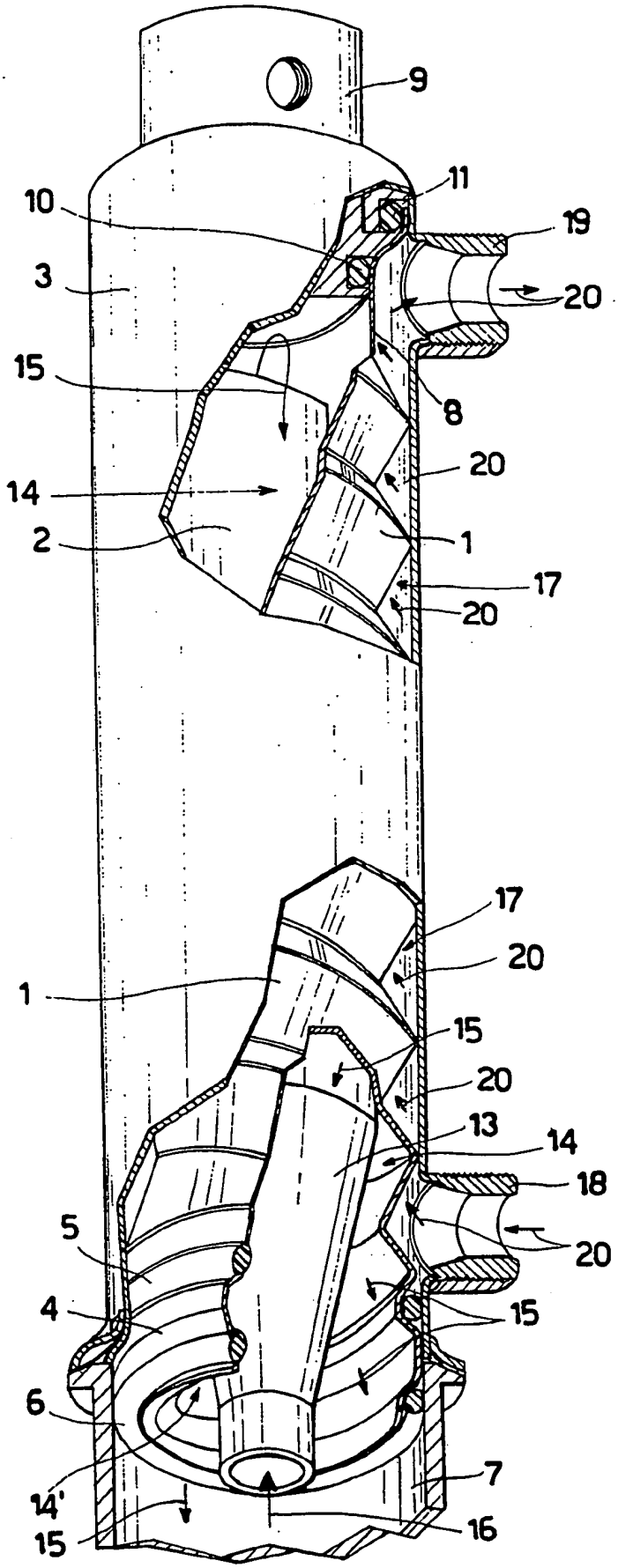
Fig.1


9
11
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15
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17
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5
20
4
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16

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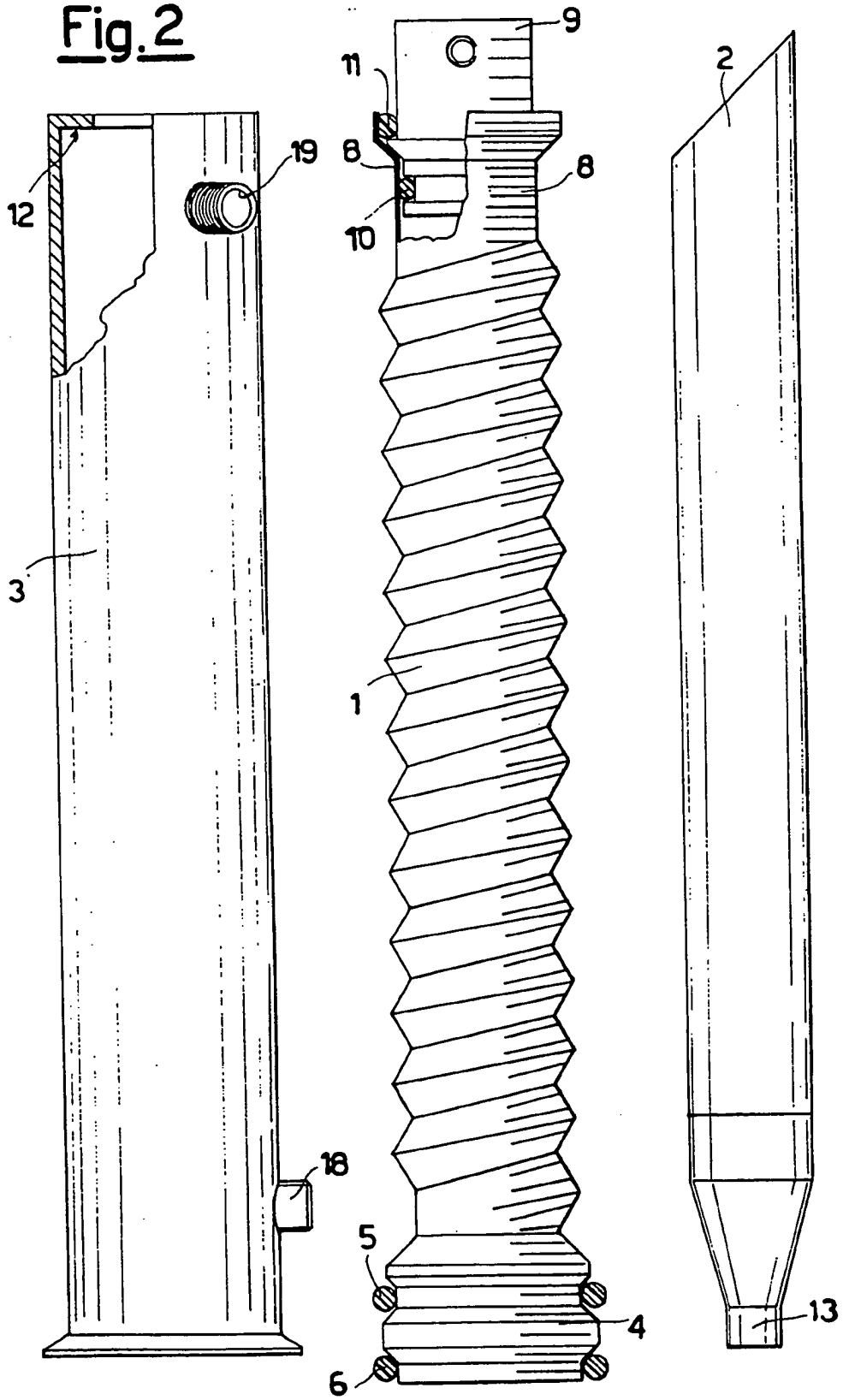
Fig.2



"HEAT EXCHANGER, ESPECIALLY SUITABLE FOR GAS HEATING UNITS FOR DOMESTIC USE"

This invention concerns a new type of heat exchanger which is extremely compact, effective, safe, economical and can be easily and rapidly disassembled for maintenance and cleaning, and is therefore especially suitable for utilization in gas heating units for domestic use, specifically for the production of hot water.

As is well known, in these heating units the hot water is heated by the heating system water through a heat exchanger.

In the current state of the technology, various types of heat exchanger suitable for this purpose are already known.

The most widely used heat exchanger is the one with coil through which the hot water flows, and which is enveloped on the outside by the heating system water. A heat exchanger of this type, however, has the severe drawback of not providing easy accessibility, so that the calcareous deposits that remain in the coil containing hot water, which is usually hard water, cannot be removed except by chemical means, and therefore not in a safe, controllable manner.

Other known types of heat exchanger, such as the plate types or those with several removable coils, eliminate the above problem but are however negatively affected by the necessary presence of seal gaskets which, in case of failure, do not prevent transfer of liquids, i.e., mixing of the hot water with the heating system water. Moreover, these gaskets, by requiring more complicated manufacturing techniques, increase the cost of the device.

The aim of this invention is expressly that of eliminating the problems described above, thus providing a heat exchanger which gives easy access to the heat exchanging surface exposed to the hot water, and therefore allows total removal of all the calcareous deposits on it; which is simple, compact and thus economical, and which also ensures constant safety in operation with no possibility of transfer of fluids.

This is substantially accomplished by a suitably shaped tube which, presenting a helical twisting swell obtained by hydromolding, defines respectively, by an inner coaxial tube and an external tube, also coaxial, the two helical paths of defluxion for the return of the heating system hot water, which rises through the inside of the inner tube, and for the hot water to be heated.

In this way, the entire heat exchanger is formed of three tubes simply inserted coaxially one within another, forming a system that is compact and easy to disassemble and is therefore easily accessible. Moreover, any possibility of transfer of fluids is prevented by a double O-ring gasket provided at each end of the heat exchanger. The economy of the system is obvious in consideration of the fact that the helical swell of the main tube is obtained simply by hydromolding.

The invention can be more clearly understood with reference to the enclosed drawings which illustrate a preferential form of practical realization given merely as example and not as limitation insofar as technical, technological or structural variations can be made while remaining within the context of this invention.

In these drawings:

A partially cutaway perspective view of a heat exchanger realized according to this invention is shown in Fig. 1.

Figure 2 is a partially cutaway view, on a different scale, of the three separate elements of which the heat exchanger is formed.

With reference to the figures, the number 1 indicates a tube with helical twisting swell obtained by hydromolding, which is inserted coaxially, sandwich-like, between an inner tube 2 and an outer tube 3.

This twisted tube 1 presents at its base end 4 two O-ring gaskets, 5 and 6, to provide seal between the tube 1 and the external tube 3, and a support tube 7, which is simply flanged to the end of tube 3. The end of the twisted tube 1 terminates instead in a neck 8 which is hermetically sealed by an air vent cap 9 through the O - ring gaskets 10 and 11. The same gasket 11, pressing against the inner edge 12 present on the upper end of the external tube 3, also creates hermetical seal between tube 1 and tube 3. Lastly, the inner tube 2 terminates at its base with a funnel-like narrowing 13, so that a chamber for the collection of water 14' is created.

In this way, between the three coaxial tubes 1, 2 and 3 are defined two helical-shaped chambers of which the inner one 14, located between the inner tube 2 and the twisted tube 1, constitutes the defluxion path for return in the direction indicated by the arrows 15 of the hot heating system water, which is emitted into the inner tube 2 in the direction indicated by the arrow 16. The other helical-shaped chamber 17 is instead located between the twisted tube 1 and the external tube 3, and is traversed by the hot water to be heated, which is emitted cold into it through the inlet 18 present at the base of the external tube 3, and is drawn hot from the oulet 19, also present at the end of the external tube 3. The path followed by the hot water in the chamber 17 is indicated in Figure 1 by the arrows 20.

CLAIMS

1. A heat exchanger comprising a twisted tube which has a helical swell and which is coaxially enclosed between an external tube and an internal tube, one end of the twisted tube being closed and the other end of the twisted tube being sealed to the external tube.

2. A heat exchanger as claimed in claim 1, wherein said one end of the twisted tube is closed by an air vent cap and by one or more O-ring gaskets.

3. A heat exchanger as claimed in claim 1 or 2, wherein said other end of the twisted tube is sealed to the external tube by one or more O-ring gaskets.

4. A heat exchanger as claimed in any of claims 1 to 3, the helical swell of the twisted tube having been formed by hydromoulding.

5. A heat exchanger as claimed in any of claims 1 to 4, wherein internal tube has a funnel-like portion at one end.

6. A heat exchanger substantially as hereinbefore described with reference to, and as shown in, the drawings.

7. Heat exchanger characterised by the fact that it is formed of a twisted tube with helical swell, which is coaxially enclosed sandwich-like between an external tube and an inner tube, the twisted tube being hermetically sealed at the end by an air vent cap provided with a double O-ring gasket, and being provided at the other base end with two O-ring gaskets cooperating to form seal with the inner surface of the external tube.